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(54) Method for making a laundering tube for a laundry washing machine and laundering tub thus made.

(57) A method for making a plastic laundering tub for a laundry washing machine, in which said tub (5) is adapted to contain a rotatable drum (10) supported by bearings (12,13) mounted in a sleeve (14) passing through a respective end wall (8) of the tub. The method is characterized in that the sleeve (14) is made separately from the tub (5) by injection-moulding of a plastic material having a high resistance against mechanical stresses in two successive moulds (16, 20), and that the sleeve (14) is subsequently placed into a third mould (26) for injection-moulding thereabout another plastic material having a lesser resistance against mechanical stresses than the previous one for thus finishing the tub (5).

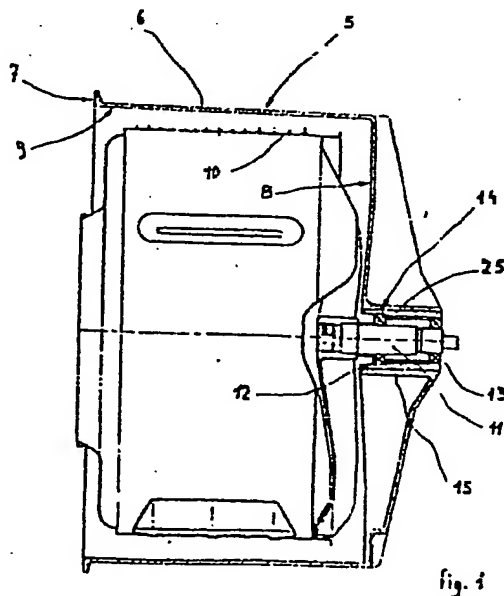


Fig. 1

The present invention relates to a method for making a  
laundering tub of a plastic material for a laundry washing  
5 machine, and to a laundering tub made by such method.  
Already known is a plastic laundering tub for a laundry  
washing machine (Italian Utility Model No 162,401), this  
tub being integrally formed with a respective end wall  
carrying at least two bearings for supporting the shaft  
10 of the drum of the machine. The bearings are maintained at  
axially spaced positions by a metal sleeve interposed  
therebetween. Also known (from European Patent No.0043429)  
is a plastic laundering tub made in one piece as in the  
preceding case, an end wall of this tub carrying a metal  
15 sleeve formed with seats for the bearings mounting the  
shaft of the drum of the laundry washing machine. These  
tubs offer the advantage of being economically obtainable  
of an inexpensive plastic material in a single injection-  
moulding operation.

20 On the other hand it has been found in practical use that  
the first type of the tub described above is particularly  
critical adjacent the locations of the support bearings  
for the drum shaft during rotation of the drum.

25 Under these conditions the bearings are subjected to con-  
siderable mechanical stresses tending to progressively  
deform the material of the tub adjacent the locations of  
the bearings.

30 The tubs of the second type described require the seats for  
the bearings in the metal sleeve to be separately and  
accurately machined, and the bearings to be force-fitted  
into the seats of the sleeve after the latter has been  
secured to the respective end wall of the tub. The con-  
35 struction and manufacture of this tub is thus obviously  
rather complicated.

It would now in fact be possible to eliminate the short-  
comings of these solutions and to achieve a durable mount-

1 ing of the bearings in a tub if such tub were completely  
made of a plastic material capable of sustaining the  
mechanical stresses acting on the bearings.

5 In this case, however, the tub would have to be made of an  
excessively expensive material and would therefore be  
ineconomical for use in a laundry washing machine.

It is therefore an object of the invention to eliminate the  
shortcomings and limitations of known plastic laundering  
10 tubs for laundry washing machines by providing a laundering  
tub of this type in which the support bearings for the  
drum shaft are safely retained, excluding any deformation  
of the material of the tub during rotation of the drum.

15 These and other objects are attained by a method for mak-  
ing a plastic laundering tub for a laundry washing machine,  
said tub being adapted to contain a rotatable drum the  
drive shaft of which is supported by at least two axially  
spaced bearings positioned in a sleeve passing through a  
20 respective end wall of the tub.

According to the invention, this method is characterized  
in that the sleeve is obtained separately from the tub,  
preferably by injection-moulding in two successive pro-  
25 cessing phases of a plastic material having a high resist-  
ance against mechanical stresses, namely, a first phase  
using a first mould for making a spacer element dimensioned  
to maintain the bearings at a suitable axial spacing, and  
a second phase in which the spacer element is placed in a  
30 second mould together with the bearings, and the plastic  
material is injection-moulded about the spacer element  
and the bearings for finishing the sleeve, the sleeve  
being subsequently placed in a third mould in which the  
tub is obtained preferably by injection-moulding about the  
sleeve of another plastic material having a lesser resist-  
35 ance against mechanical stresses than the previous one.

The characteristics of the invention will become more  
clearly evident from the following description, given by

1 way of example with reference to the accompanying drawings,  
wherein:

fig. 1 shows an axially sectioned view of a laundering tub  
according to an embodiment of the invention, and  
5 figs. 2, 3 and 4 show diagrammatical sectional views  
representing successive phases of the manufacture  
of the tub according to fig. 1.

With reference to fig. 1, a laundering tub 5 according to  
10 the invention is substantially made of a plastic material  
and comprises a peripheral wall 6 and two opposite end  
walls 7 and 8, of which end wall 7 is formed with an access  
opening 9.

15 The tub is adapted to contain a rotatable drum 10, and is  
mounted in a conventional manner in the housing (not shown)  
of a laundry washing machine.

Drum 10 is provided with a drive shaft 11 supported by at  
least two axially spaced bearings 12 and 13 retained in a  
20 sleeve 14 made of a plastic material and passing through  
a hub portion 15 formed in end wall 8 of tub 5. The tub  
is made by a manufacturing method involving successive  
phases as depicted in figs. 2, 3 and 4.

25 In particular, this method is initially directed to the  
manufacture of sleeve 14 separately from tub 5, preferably  
by injection-moulding in two successive processing phases  
(shown respectively in figs. 2 and 3) of a plastic material  
having a high resistance against mechanical stresses, for  
30 instance glass-fibre reinforced polyester.

For the first processing phase, use is made of a first  
mould 16 (fig. 2) having a female element 17 and a male  
element 18 configured to form a spacer element 19 in the  
35 shape of a cylindrical sleeve, the function of which to be  
explained as the description proceeds.

In the subsequent second processing phase, use is made of

1 a second mould 20 (fig. 3) having a female element 21 and  
a male element 22 configured to form the sleeve 14 as  
specified above. More particularly, male element 22 of  
mould 20 is provided with a lateral cylindrical projection  
5 23 adapted to have bearing 12, spacer element 19 and bear-  
ing 13 mounted thereon prior to being inserted into female  
element 21. After bearing 12, spacer element 19 and bear-  
ing 13 have been thus mounted on projection 23, the latter  
is inserted into female element 21 into compressive  
10 engagement therewith of bearing 13 to thereby define an  
annular cavity between the outer surfaces of bearings 12  
and 13 and spacer element 19 and the inner wall surface of  
female element 21.

15 A subsequently injected plastic material is thus injection-  
moulded about bearings 12, 13 and spacer element 19 so as  
to form the cylindrical wall 25 of sleeve 14 (fig. 1). At  
the end of this operation, sleeve 14 is placed in a third  
mould 26 (fig. 4) having a female element 27 and a male  
20 element 28 cooperating to define a cavity for injection-  
moulding tub 5 by the use of another plastic material  
having a lesser resistance against mechanical stresses  
than the previous one, for instance polypropylene.

In particular, male element 28 of mould 26 has a lateral  
25 cylindrical projection 29 adapted to have sleeve 14  
mounted thereon prior to male element 28 being inserted  
into female element 27. As male element 28 is subsequently  
inserted into female element 27 preparatory to injection-  
moulding tub 5, projection 29 maintains sleeve 14 in pos-  
30 ition between female element 27 and male element 28  
adjacent end wall 8 of tub 5 while additionally preventing  
the plastic material subsequently injected into mould 26  
from penetrating into the sleeve itself.

85 In the closed state of mould 26, female element 27 and male  
element 28 cooperate to define cavities 30, 31 and 32  
communicating with one another for injection-moulding  
peripheral wall 6, end wall 8 and a peripheral flange for

1 securing end wall 7 to tub 5.

The finished tub is thus made of two different types of plastic material, namely, a more expensive first type  
5 having a high resistance against mechanical stresses, only a limited amount of which is employed for injection-moulding the portion supporting the drive shaft of the drum, and a less expensive second type having a lesser resistance against mechanical stresses than the previous one, which  
10 is injection-moulded about the plastic material of the first type at a sufficient amount for forming the remainder of the tub. This permits simple injection-moulding techniques to be employed for making a plastic laundering tub provided with a reliable mounting for the drum made of a  
15 non-deformable material.

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Method for Making a Laundering Tub for a  
Laundry Washing machine and Laundering Tub  
Thus Made

Patent Claims

1. A method for making a plastic laundering tub for a laundry washing machine, said tub being adapted to contain a rotatable drum the drive shaft of which is supported by at least two axially spaced bearings positioned in a sleeve passing through a respective end wall of said tub, characterized in that said sleeve (14) is obtained separately from said tub (5), preferably by injection moulding in two successive processing phases of a plastics material having a high resistance against mechanical stresses, namely, a first phase using a first mould (16) for making a spacer element (19) dimensioned to maintain said bearings (12, 13) at a suitable axial spacing, and a second phase in which said spacer element (19) is placed in a

1 second mould (20) together with said bearings (12, 13), and  
the plastics material is injection-moulded about said  
spacer element (19) and said bearings (12, 13) for finish-  
ing said sleeve (14), said sleeve (14) being subsequently  
5 placed in a third mould (26) in which said tub (5) is  
obtained preferably by injection-moulding about said  
sleeve (14) of another plastics material having a lesser  
resistance against mechanical stresses than the previous  
one.

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2. A method according to claim 1, characterized in that  
the male element (22) of said second mould (20) is provided  
with a lateral cylindrical projection (23) adapted to have  
said bearings (12, 13) positioned thereon with said spacer  
15 element (19) therebetween, the female element (21) of said  
mould (20) being adapted to compressively engage at least  
one of said bearings (13).

3. A method according to claim 1, characterized in that  
the male element (28) of said third mould (26) is provided  
20 with a lateral cylindrical projection (29) adapted to have  
said sleeve (14) mounted thereon between said male element  
(28) and the female element (27) of said third mould (26)  
at a position corresponding to said end wall (8) of said  
tub (5).

25

4. A plastic laundering tub for a laundry washing  
machine, obtained by the manufacturing method according  
to claims 1 - 3, said tub being adapted to contain a  
rotatable drum the drive shaft of which is supported by  
30 at least two axially spaced bearings positioned in a  
sleeve passing through a respective end wall of said tub,  
characterized in that said sleeve (14) is made of a plastic  
material having a high resistance against mechanical  
stresses, and provided with at least one spacer element  
35 (19) interposed between said bearings (12, 13) for main-  
taining them at axially spaced positions, and that said  
tub (5) is made of another plastic material injection-  
moulded about said sleeve (14) and having a lesser



1 resistance against mechanical stresses than the previous  
one.

5. A laundering tub according to the preceding claims,  
5 substantially as described with reference to the accompanying drawings and for the specified purposes.

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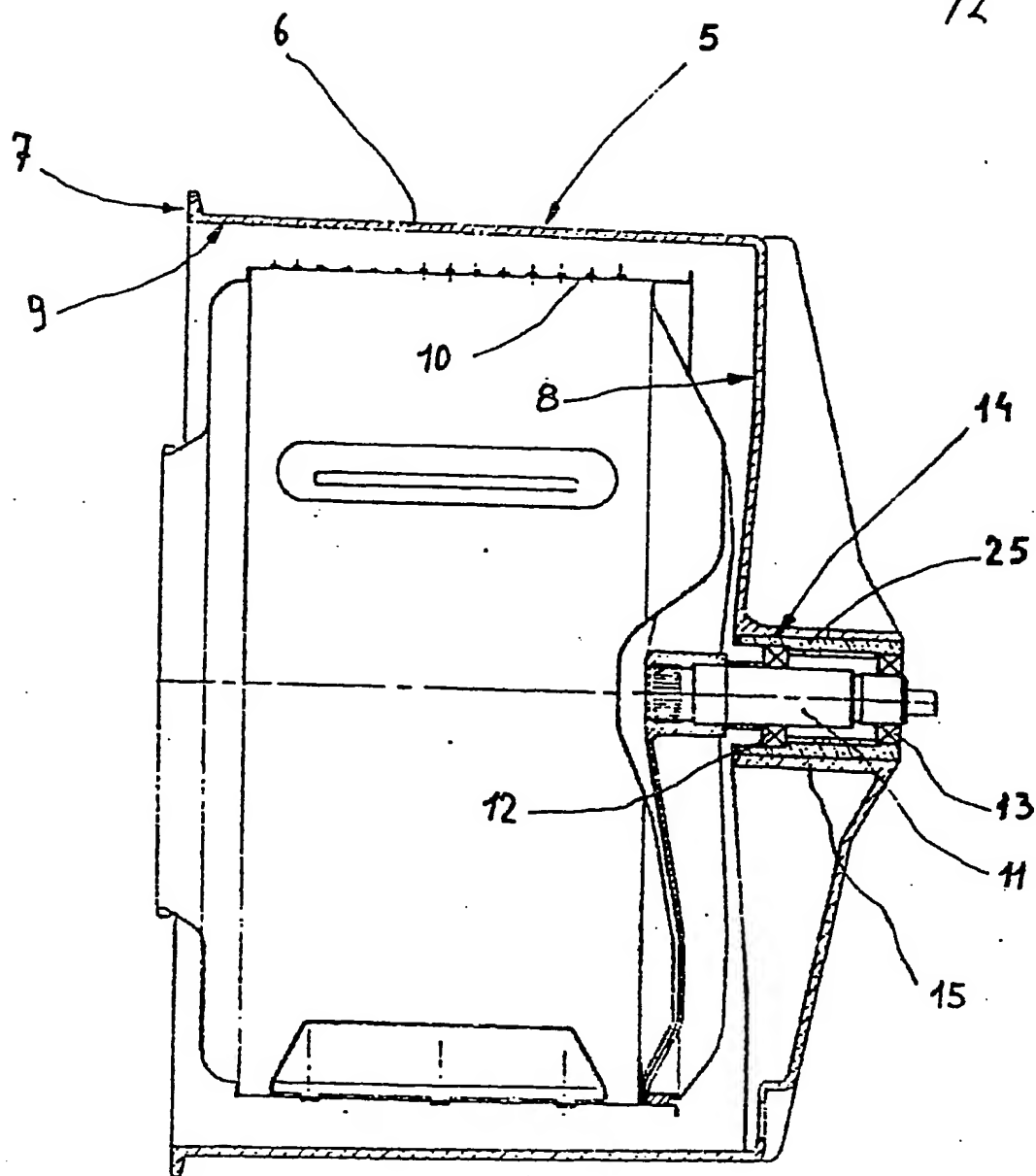
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fig. 1

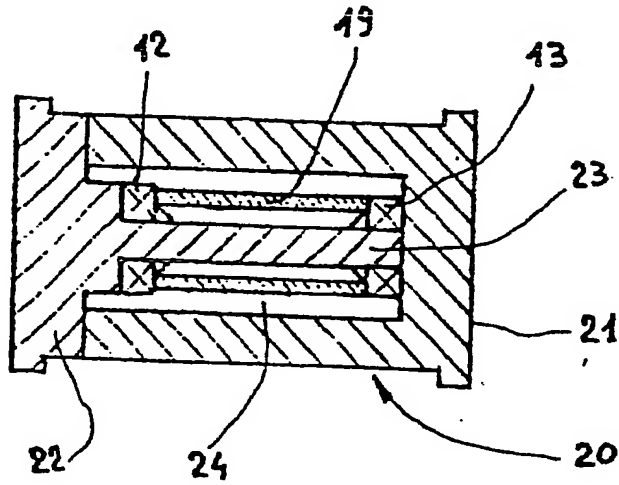
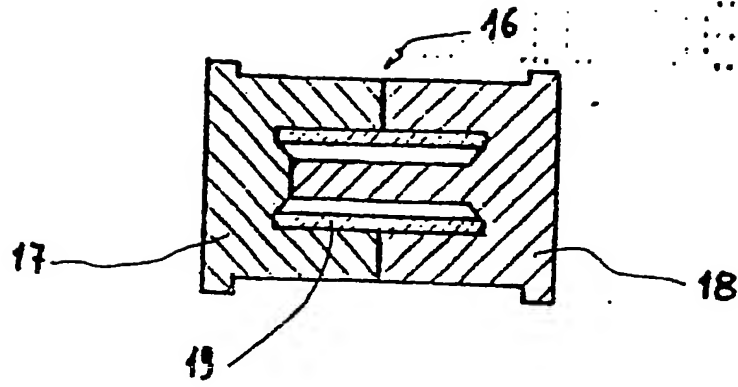


fig. 3

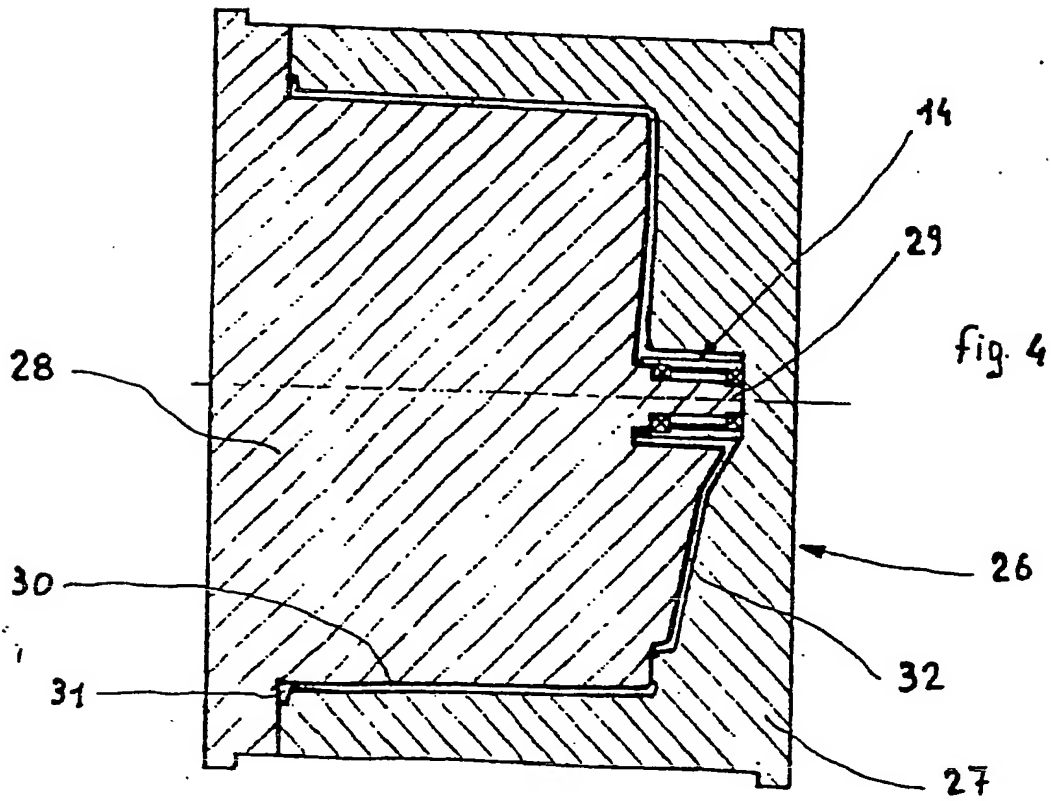


fig. 4